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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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McDERMOTT, WILL & EMERY
600 13th Street, N.W.
Washington, DC 20005-3096

EXAMINER

MOELL, JESSE R

ART UNIT	PAPER NUMBER
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2181

MAIL DATE	DELIVERY MODE
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12/07/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/757,939

Applicant(s)

HANSEN ET AL.

Examiner

JESSE R. MOLL

Art Unit

2181

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 September 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 June 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/GS/US)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

1. Claims 1-28 have been examined.

Priority

2. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994).

The disclosure of the prior-filed application, Application No. 09/169,963, fails to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for one or more claims of this application. Claims 1-28 are not supported by this Application. For example, Application No. 09/169,963 does not adequately support catenating multiple arithmetic results from a single instruction. The Applications 09/169,963, 08/754,827 and 08/516,036 are not available under 35 U.S.C.

120. The Application with the oldest valid priority date is the Provisional Application 60/097,635 filed 24 August 1998.

Response to Amendment

3. The declaration filed on 18 September 2009 under 37 CFR 1.131 has been considered but is ineffective to overcome the Laudon reference.
4. The Laudon reference is a statutory bar under 35 U.S.C. 102(b) and thus cannot be overcome by an affidavit or declaration under 37 CFR 1.131. The effective priority date of the current application is 24 August 1998 while the Laudon reference was published in 1994.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 6-8, 12, 13, 18-20 and 24-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cray, Jr. (U.S. Patent No. 4,128,880) herein referred to as

Cray in view of Matsuura et al. (U.S. Patent No. 4,725,973) herein referred to as Matsuura.

7. Referring to claim 1, Cray discloses, as claimed, a programmable processor (as shown in figure 2) comprising: a data path (Such as lines carrying V_i , V_k and V_l and data path 21; see fig. 2), lines capable of transmitting data (inherently, by definition, a data path is capable of transmitting data); an external interface operable to receive data from an external source (Memory 12) and communicate the received data over the data path (see col. 4; lines 3-8); a register file containing a plurality of registers (Vector Registers 20; see fig. 2) each having a register width (64 elements wide; see col. 3, lines 50-62), the register file coupled to the data path and configured to support processing of a plurality of threads (programs; see Col. 9, lines 38-43) and to store a plurality of multiple-bit data elements in partitioned fields (see col. 3, lines 50-62), each of the multiple-bit data elements having an elemental width (64 bit) smaller than the register width (4096 bit); an execution unit (Including Vector Functional Units; see fig. 2) coupled to the data path (see fig. 2), the execution unit configured to execute a plurality of instruction streams from the plurality of threads (see Col. 9, lines 38-43), each instruction stream including a single instruction (such as the instruction shown in Fig. 3A; col. 9, lines 44-50; any instruction stream will inherently include at least 1 instruction) that specifies an arithmetic operation (addition; see col. 8, lines 28-35) to cause multiple instances of the operation to be performed, each instance of the arithmetic operation to be performed using a different one of the plurality of multiple-bit

data elements (see col. 10, lines 19-50) in partitioned fields of at least one of the registers to produce a catenated result (result register; see col. 5, 60-65) and execute multiple instances of the arithmetic instruction to produce the catenated result (The results must be catenated into the destination register V_j).

Note claims 8, 13, and 20 recite the corresponding limitations as set forth above in claim 1. Peleg also discloses as to Claims 8 and 20 first and second registers (such as registers V0-V3 and V4-V7).

Cray does not expressly disclose wherein each of the multiple-bit data elements has an elemental width, and the data path has a data path width multiple times greater than the elemental width, to allow multiple-bit data elements used for the multiple instances of the arithmetic operation to be transmitted in parallel from the register file to the execution unit, and wherein the execution unit is operable to receive, in parallel, multiple-bit data elements for the multiple instances of the arithmetic operation.

Matsuura teaches each of the multiple-bit data elements has an elemental width, and the data path has a data path width multiple times greater than the elemental width (n times greater; see col. 3, lines 25-30), to allow multiple-bit data elements used for the multiple instances of the arithmetic operation to be transmitted in parallel from the register file to the execution unit (see col. 3, lines 29-31), and wherein the execution unit is operable to receive, in parallel, multiple-bit data elements for the multiple instances of the arithmetic operation (see col. 3, lines 25-28).

At the time of the invention, it would have been obvious for one of ordinary skill in the art to have modified the invention of Cray by using multiple banks of vector registers and multiple ALUs, as taught by Matsuura, in order to increase data throughput.

8. As to claim 6, Cray also discloses: the processor of claim 1 further comprising a virtual memory addressing unit and a cache operable to store data communicated between the external interface (certainly existing in Cray's system for handling input/output operation for peripherals) and the data path. Claim 18 recites the corresponding limitations as set forth above in claim 6.

9. As to claim 7, Cray also discloses: the processor of claim 1 wherein the execution unit is further operable to, in response to decoding a second single instruction specifying a first and a second register (V_i and V_k ; see fig. 2; col. 9, lines 44-58) each containing a plurality of operands (Vector register elements; see col. 5, lines 45-60), multiply the plurality of floating point operands (see col. 8, lines 49-53) in the first register (V_i) by the plurality of in the second register (V_k) to produce a plurality of products and provide the plurality of products to partitioned fields of a result register (V_i ; see col. 5, lines 45-65) as a second catenated result. Note Claims 12, 19, and 24 recite the corresponding limitations as set forth above in claim 7.

10. As to claim 25, Cray also discloses the arithmetic operation comprises an integer operation (see col. 11, lines 13-24). Note Claims 27 recites the corresponding limitations as set forth above in claim 26.

11. As to claim 26, Cray also discloses the arithmetic operation comprises a floating-point operation (see col. 17, lines 13-26). Note Claims 27 recites the corresponding limitations as set forth above in claim 26 and claim 28 recites equivalent limitations as 13 and 26 discussed above.

12. Claims 2-5, 9-11, 14-17 and 21-23 rejected under 35 U.S.C. 103(a) as being unpatentable over Cray in view of Matsuura and in further view of Laudon et al. (Interleaving: a Multithreading Technique Targeting Multiprocessor and Workstations) herein referred to as Laudon.

13. As to claims 2, 9, 14 and 21, Cray/Matsuura does not expressly disclose the execution unit comprises a pipeline having a plurality of stages and wherein the pipeline interleaves execution of instructions from the plurality of instruction streams.

14. As to claims 3, 10, 15 and 22, Cray/Matsuura does not expressly disclose the pipeline is operable to simultaneously contain states of execution of at least two instructions from different instruction streams.

15. As to claims 4, 11, 16 and 23, Cray/Matsuura does not expressly disclose execution of the instructions is interleaved in a round-robin manner.

16. As to claims 5 and 17, Cray/Matsuura does not expressly disclose the processor ensures only one thread from the plurality of threads can handle an exception at any given time

17. Laudon teaches the execution unit comprises a pipeline having a plurality of stages (see page 311, Figure 5) and wherein the pipeline interleaves execution of instructions from the plurality of instruction streams (see page 310, Figure 3, Interleaved Scheme).

18. Laudon teaches the pipeline is operable to simultaneously contain states of execution of at least two instructions from different instruction streams (see page 310, Figure 3, Interleaved Scheme).

19. Laudon teaches execution of the instructions is interleaved in a round-robin manner (see page 310, Figure 3, Interleaved Scheme).

20. Laudon teaches the processor ensures only one thread from the plurality of threads can handle an exception at any given time (see page 315, right column).

21. It would have been obvious for one of ordinary skill in the art at the time of the invention to have modified the combination of Cray and Matsuura (as shown above) by modifying the execution unit to comprise a pipeline having a plurality of stages and wherein the pipeline interleaves execution of instructions from the plurality of instruction streams wherein the pipeline is operable to simultaneously contain states of execution of at least two instructions from different instruction streams interleaved in a round-robin manner ensuring only one thread from the plurality of threads can handle an exception at any given time, as taught by Laudon, in order to increase performance (see Laudon, page 313, Table 7).

Response to Arguments

22. Applicant's arguments with respect to the Laudon reference have been considered but are not persuasive. See above regarding the claimed priority and the declaration under 37 CFR 1.131

The arguments directed to the Chen reference are moot in view of the new grounds of rejection presented above.

Conclusion

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse R. Moll whose telephone number is (571)272-2703. The examiner can normally be reached on M-F 10:00 am - 6:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alford Kindred can be reached on (571)272-4037. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

24. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Alford W. Kindred/
Supervisory Patent Examiner, Art Unit 2181
/J. R. M./

Examiner, Art Unit 2181